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1	15	429/12-46.ccls. and ((scandia or Sc) same mol\$1)	USPAT; US-PGPUB	2003/10/30 19:23
2	12	429/12-46.ccls. and (scandia same mol\$1)	USPAT; US-PGPUB	2003/10/30 19:23
3	3	(429/12-46.ccls. and ((scandia or Sc) same mol\$1)) not (429/12-46.ccls. and (scandia same mol\$1))	USPAT; US-PGPUB	2003/10/30 19:23
-	319	ukai.in.	USPAT; US-PGPUB	2003/10/29 19:06
-	1627	mizutani.in.	USPAT; US-PGPUB	2003/10/29 19:07
-	1944	ukai.in. or mizutani.in.	USPAT; US-PGPUB	2003/10/29 19:07
-	9	(ukai.in. or mizutani.in.) and 429/12-46.ccls.	USPAT; US-PGPUB	2003/10/30 10:40
-	1634	429/30,40.ccls.	USPAT; US-PGPUB	2003/10/30 10:41
-	1625	429/33,41,44.ccls.	USPAT; US-PGPUB	2003/10/30 10:41
-	378	429/30,40.ccls. and (solid adj oxide)	USPAT; US-PGPUB	2003/10/30 10:45
-	4	((("5399184") or ("5958616") or ("6485855") or ("6630263"))).PN.	USPAT	2003/10/30 10:45
-	0	((("5399184") or ("5958616") or ("6485855") or ("6630263"))).PN.) and (solid adj oxide)	USPAT	2003/10/30 10:46
-	228	(429/30,40.ccls. and (solid adj oxide)) and (zirconia or yttria)	USPAT	2003/10/30 10:54
-	200	(429/30,40.ccls. and (solid adj oxide)) and (yttria)	USPAT	2003/10/30 10:55
-	201	(429/30,40.ccls. and (solid adj oxide)) and (yttria or scandia)	USPAT	2003/10/30 10:55
-	267	(429/30,40.ccls. and (solid adj oxide)) and (yttria or scandia)	USPAT; US-PGPUB	2003/10/30 11:59
-	2629	429/30,40.ccls. or 429/33,41,44.ccls.	USPAT; US-PGPUB	2003/10/30 11:59
-	35	(429/30,40.ccls. or 429/33,41,44.ccls.) and (bend\$3 adj strength)	USPAT; US-PGPUB	2003/10/30 13:27
-	359	(429/30,40.ccls. or 429/33,41,44.ccls.) and (mechanical adj strength)	USPAT; US-PGPUB	2003/10/30 14:11
-	1	"6428920"	USPAT; US-PGPUB	2003/10/30 13:27
-	156	(429/30,40.ccls. or 429/33,41,44.ccls.) and (mechanical adj strength) and mol	USPAT; US-PGPUB	2003/10/30 13:29
-	170	(429/30,40.ccls. or 429/33,41,44.ccls.) and (mechanical adj strength) and mol\$1	USPAT; US-PGPUB	2003/10/30 13:29
-	6900	429/12-46.ccls.	USPAT; US-PGPUB	2003/10/30 14:11
-	50	429/12-46.ccls. and (mol\$1 same (nickel or Ni) same (yttria or scandia))	USPAT; US-PGPUB	2003/10/30 17:08
-	22	429/12-46.ccls. and (mol\$1 same (cobalt or Co or ruthenium or Ru) same (yttria or scandia))	USPAT; US-PGPUB	2003/10/30 16:52
-	2	(fuel adj cell) and (mol\$1 same (nickel or Ni) same (yttria or scandia))	EPO; JPO	2003/10/30 16:52
-	0	(fuel adj cell) and (mol\$1 same (cobalt or Co or ruthenium or Ru) same (yttria or scandia))	EPO; JPO	2003/10/30 17:03
-	1	"02002878"	DERWENT	2003/10/30 17:03
-	1	"02002878"	JPO	2003/10/30 17:03
-	115	429/12-46.ccls. and (scandia)	USPAT; US-PGPUB	2003/10/30 17:09
-	0	429/12-46.ccls. and (scandia same yttria)	USPAT; US-PGPUB	2003/10/30 17:09
-	94	429/12-46.ccls. and (scandia same yttria)	USPAT; US-PGPUB	2003/10/30 17:09
-	59	429/12-46.ccls. and (scandia same yttria) and mol\$1	USPAT; US-PGPUB	2003/10/30 17:10
-	12	429/12-46.ccls. and (scandia same mol\$1)	USPAT; US-PGPUB	2003/10/30 19:23
-	9	"5261944"	USPAT; US-PGPUB	2003/10/30 17:36

-	1	6428920.pn. and interfacial	USPAT; US-PGPUB	2003/10/30 17:42
-	6	"5908713"	USPAT; US-PGPUB	2003/10/30 17:42

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FILE 'HOME' ENTERED AT 16:52:43 ON 30 OCT 2003

=> file caplus
COST IN U.S. DOLLARS

SINCE FILE	TOTAL
ENTRY	SESSION
0.21	0.21

FULL ESTIMATED COST

FILE 'CAPLUS' ENTERED AT 16:52:51 ON 30 OCT 2003

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FILE COVERS 1907 - 30 Oct 2003 VOL 139 ISS 18

FILE LAST UPDATED: 29 Oct 2003 (20031029/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

=> s (fuel adj cell) and (mol1 same (cobalt or Co or ruthenium or Ru) same (yttria or scandia))

1 IS NOT A RECOGNIZED COMMAND

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For a list of commands available to you in the current file, enter

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=> s (fuel cell) and (mol (p) (cobalt or Co or ruthenium or Ru) (p) (yttria or scandia))

322163 FUEL
1706529 CELL
36003 FUEL CELL
(FUEL(W) CELL)
2036663 MOL
326212 COBALT
739209 CO
75379 RUTHENIUM
57274 RU
24781 YTTRIA
447 SCANDIA
82 MOL (P) (COBALT OR CO OR RUTHENIUM OR RU) (P) (YTTRIA OR SCANDIA)
L1 22 (FUEL CELL) AND (MOL (P) (COBALT OR CO OR RUTHENIUM OR RU) (P)
(YTTRIA OR SCANDIA))

=> d l1 1-22 ibib kwic ab

L1 ANSWER 1 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2002:936920 CAPLUS

DOCUMENT NUMBER: 138:290334

TITLE: Electrochemical properties of reduced-temperature
SOFCs with mixed ionic-electronic conductors in
electrodes and/or interlayers

AUTHOR(S): Matsuzaki, Yoshio; Yasuda, Isamu
 CORPORATE SOURCE: Fundamental Technology Laboratory, Tokyo Gas Co. Ltd.,
 Tokyo, Minato, 105-0023, Japan
 SOURCE: Solid State Ionics (2002), 152-153, 463-468
 CODEN: SSIOD3; ISSN: 0167-2738
 PUBLISHER: Elsevier Science B.V.
 DOCUMENT TYPE: Journal
 LANGUAGE: English

- AB . . . were fired onto both surfaces of the electrolyte of 0.2-mm thickness at 1523 K, before firing the Ni-Sm_{0.1}Ce_{0.9}O_{1.95}-(CeO₂)_{0.1}[(Y₂O₃)_{0.08}(ZrO₂)_{0.92}]_{0.9} (Ni-SDC-CeYSZ) (10 mol% ceria-doped **yttria**-stabilized zirconia [YSZ]) cermet anode at 1723 K and La_{0.7}Sr_{0.3}Co_{0.2}Fe_{0.8}O₃-Sm_{0.2}Ce_{0.8}O_{1.9} (LSCF-SDC) composite cathode at 1373 K. The cells have a nominal. . . time of 1000 h. Anode-supported cells with a thin YSZ electrolyte film approx. 30 .mu.m thick were also prepd. by co-sintering of screen-printed YSZ paste on a compacted anode substrate. The cells have a nominal size of 50.times.50 mm² with an. . .
- ST lanthanum gallium trioxide electrolyte solid oxide **fuel cell**; cerium yttrium stabilized zirconia anode **fuel cell**; samarium doped ceria anode solid oxide **fuel cell**; strontium lanthanum cobalt iron oxide cathode **fuel cell**
- IT Electric conductivity
 Electric current-potential relationship
 Fuel cell anodes
 Fuel cell cathodes
 Fuel cell electrolytes
 Ionic conductivity
 Solid state fuel cells
 (electrochem. properties of reduced-temp. solid-oxide fuel cells with mixed ionic-electronic conductors in electrodes and/or interlayers)
- IT 117655-29-5, Cerium samarium oxide Ce_{0.9}Sm_{0.1}O_{1.95} 158985-67-2, Cerium yttrium zirconium oxide Ce_{0.1}Y_{0.14}Zr_{0.83}O_{2.07}
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process); USES (Uses)
 (**fuel cell** anode component; electrochem. properties of reduced-temp. solid-oxide fuel cells with mixed ionic-electronic conductors in electrodes and/or interlayers)
- IT 116875-84-4, Cerium samarium oxide Ce_{0.8}Sm_{0.2}O_{1.9} 119883-91-9, Cobalt iron lanthanum strontium oxide Co_{0.2}Fe_{0.8}La_{0.7}Sr_{0.3}O₃
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process); USES (Uses)
 (**fuel cell** cathode component; electrochem. properties of reduced-temp. solid-oxide fuel cells with mixed ionic-electronic conductors in electrodes and/or interlayers)
- IT 400716-50-9, Gallium lanthanum magnesium strontium oxide Ga_{0.8}La_{0.9}Mg_{0.2}Sr_{0.1}O_{2.8}
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process); USES (Uses)
 (**fuel cell** electrolyte; electrochem. properties of reduced-temp. solid-oxide fuel cells with mixed ionic-electronic conductors in electrodes and/or interlayers)
- AB We have investigated the electrochem. properties of two types of reduced-temp. solid oxide fuel cells (SOFCs) in which the mixed ionic-electronic conductors are used to improve their performances. Electrolyte-supported cells, in which doped LaGaO₃ strengthened by Al₂O₃ dispersion is used as the electrolyte, were prepd. and tested. Samaria-doped ceria (SDC) interlayers of 0.3-.mu.m thickness were fired onto both surfaces of the electrolyte of 0.2-mm thickness at 1523 K, before firing the Ni-Sm_{0.1}Ce_{0.9}O_{1.95}-(CeO₂)_{0.1}[(Y₂O₃)_{0.08}(ZrO₂)_{0.92}]_{0.9}

(Ni-SDC-CeYSZ) (10 mol% ceria-doped yttria-stabilized zirconia [YSZ]) cermet anode at 1723 K and La_{0.7}Sr_{0.3}Co_{0.2}Fe_{0.8}O₃-Sm_{0.2}Ce_{0.8}O_{1.9} (LSCF-SDC) composite cathode at 1373 K. The cells have a nominal size of 60.times.60 mm² with an effective electrode area of 4 cm². The single cell thus prepd. showed a high power d. of 0.67 W cm⁻² at 1073 K and long-term stability during the operation time of 1000 h. Anode-supported cells with a thin YSZ electrolyte film approx. 30 .mu.m thick were also prepd. by co-sintering of screen-printed YSZ paste on a compacted anode substrate. The cells have a nominal size of 50.times.50 mm² with an effective electrode area of 4 cm². The single cell with the LSCF-SDC composite cathode having SDC interlayer showed the max. power d. of 0.648 W cm⁻² at 1023 K. The bilayer cathode also showed high resistance against degrdn. by Cr-poisoning.

REFERENCE COUNT: 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 2 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2002:829542 CAPLUS

DOCUMENT NUMBER: 138:59982

TITLE: Formation of secondary phases at the interface between strontium-doped lanthanum manganite and yttria-stabilized zirconia

AUTHOR(S): Yang, Chih-Chung T.; Wei, Wen-Cheng J.; Roosen, Andreas; Buchkremer, H. P.

CORPORATE SOURCE: Department of Materials Science and Engineering, National Taiwan University, Taipei, Taiwan

SOURCE: Ceramic Engineering and Science Proceedings (2002), 23(3), 733-740

CODEN: CESPDK; ISSN: 0196-6219

PUBLISHER: American Ceramic Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB . . . at the interface between zirconia electrolytes and Sr-doped Lanthanum Manganite in planar Solid Oxide Fuel Cells (SOFCs) was investigated. Zirconia-8 mol% Yttria (YSZ) electrolyte was fabricated by tape casting and coated with the cathode material La_{0.65}Sr_{0.30}MnO₃ (LSM) by screen-printing. The structures were co-fired under different conditions. The sintered specimens were annealed at 1000.degree.C for various periods. The formation of secondary phases and interdiffusion. . .

IT Fuel cell cathodes

(lanthanum strontium manganite; lanthanum strontium manganite cathode interface reaction with yttria-stabilized zirconia electrolyte in relation to performance in solid oxide fuel cells)

AB The formation of secondary phases at the interface between zirconia electrolytes and Sr-doped Lanthanum Manganite in planar Solid Oxide Fuel Cells (SOFCs) was investigated. Zirconia-8 mol% Yttria (YSZ) electrolyte was fabricated by tape casting and coated with the cathode material La_{0.65}Sr_{0.30}MnO₃ (LSM) by screen-printing. The structures were co-fired under different conditions. The sintered specimens were annealed at 1000.degree.C for various periods. The formation of secondary phases and interdiffusion effects at the interface of these samples were studied by X-ray diffractometry (XRD), SEM and TEM equipped with energy-dispersive spectroscopy (EDS). The results of the formation of secondary phases and diffusion effects are discussed with regard to the processing conditions.

REFERENCE COUNT: 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 3 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2002:459074 CAPLUS

DOCUMENT NUMBER: 137:327336

TITLE: Fracture energy and crack growth in surface treated yttria stabilized zirconia for SOFC applications

AUTHOR(S): Kumar, Amar N.; Sorensen, Bent F.
CORPORATE SOURCE: Department of Applied Mechanics, Indian Institute of
Technology, Hauz-Khas, New Delhi, 110 016, India
SOURCE: Materials Science & Engineering, A: Structural
Materials: Properties, Microstructure and Processing
(2002), A333(1-2), 380-389
CODEN: MSAPE3; ISSN: 0921-5093
PUBLISHER: Elsevier Science B.V.
DOCUMENT TYPE: Journal
LANGUAGE: English

AB The solid oxide **fuel cell** (SOFC) electrolyte, 8
mol% cubic phase **yttria** stabilized zirconia (YSZ), is
coated and co-sintered with different electrode coatings. The
fracture toughness and stable crack growth behavior of the treated YSZ are
investigated and compared.

ST solid oxide **fuel cell** surface treated yttria
stabilized zirconia

AB The solid oxide **fuel cell** (SOFC) electrolyte, 8
mol% cubic phase **yttria** stabilized zirconia (YSZ), is
coated and co-sintered with different electrode coatings. The
fracture toughness and stable crack growth behavior of the treated YSZ are
investigated and compared with that of pure YSZ. Two energy release rate
(G) values, corresponding to crack initiation (G_i) and crack arrest (G_a)
are used to characterize the cracking behavior. An improvement in the
fracture resistance behavior by around 30-50% as compared with untreated
YSZ is obsd. due to coating effects. Crack growth rate, da/dt , as a
function of applied G is represented by a power law of the form $da/dt=A$
(G) n , where A and n are the fitting consts. Interdiffusion of both Mn and
Ni from coatings into the YSZ lattice during sintering appears to
introduce residual stresses leading to an improvement in the fracture
energy. The cracking mode for all the surface treated ceramics is
identified to be predominantly transgranular in nature. Crack bridging
appears to contribute for improved fracture toughness values in surface
treated YSZ.

REFERENCE COUNT: 27 THERE ARE 27 CITED REFERENCES AVAILABLE FOR THIS
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L1 ANSWER 4 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2000:880174 CAPLUS

DOCUMENT NUMBER: 134:19326

TITLE: Regenerative solid oxide fuel cells for Mars
exploration

AUTHOR(S): Sridhar, K. R.; Foerstner, R.

CORPORATE SOURCE: University of Arizona, Tucson, AZ, 85719, USA

SOURCE: Journal of Propulsion and Power (2000), 16(6),
1105-1111

CODEN: JPPOEL; ISSN: 0748-4658

PUBLISHER: American Institute of Aeronautics and Astronautics

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A regenerative solid oxide **fuel cell** was designed,
built, and tested for Mars exploration. The **fuel cell**
operates at night on CO and excess O₂ generated during the day
from the Mars atm. CO₂. The primary objective of the device was to . . .
generate O₂ from the Mars atm. for use as an ascent vehicle propellant.
The cells tested were composed of an 8-mol% **yttria**
-stabilized zirconia electrolyte and two platinum electrodes. The results
obtained from the exptl. tests were consistent with the theor. relations
predicted by thermodyn. and electrochem. The performance loss of the
fuel cell, obsd. during the first 40 h of operation in
the **fuel cell** mode, was attributed to chemisorption of
CO by the platinum electrodes. It was found that the concn.
overpotential was negligible and the calcd. activation overpotential fit
well.

ST solid oxide **fuel cell** regenerative Mars
 AB A regenerative solid oxide **fuel cell** was designed, built, and tested for Mars exploration. The **fuel cell** operates at night on CO and excess O₂ generated during the day from the Mars atm. CO₂. The primary objective of the device was to generate O₂ from the Mars atm. for use as an ascent vehicle propellant. The cells tested were composed of an 8-mol% **yttria**-stabilized zirconia electrolyte and two platinum electrodes. The results obtained from the exptl. tests were consistent with the theor. relations predicted by thermodyn. and electrochem. The performance loss of the **fuel cell**, obsd. during the first 40 h of operation in the **fuel cell** mode, was attributed to chemisorption of CO by the platinum electrodes. It was found that the concn. overpotential was negligible and the calcd. activation overpotential fit well with the Tafel equation. The results suggest that operating O₂ generator cells as fuel cells with low fuel utilization at night has advantages for Mars missions.

REFERENCE COUNT: 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 5 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2000:718469 CAPLUS

DOCUMENT NUMBER: 133:364383

TITLE: Perovskite oxides for the cathode in solid oxide fuel cells

AUTHOR(S): Takeda, Yasuo; Sakaki, Yoshinori; Tu, Heng Young; Phillipps, Michael Brian; Imanishi, Nobuyuki; Yamamoto, Osamu

CORPORATE SOURCE: Department of Chemistry, Faculty of Engineering, Mie University, 514-8507, Japan

SOURCE: Electrochemistry (Tokyo) (2000), 68(10), 764-770
 CODEN: EECTFA; ISSN: 1344-3542

PUBLISHER: Electrochemical Society of Japan

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The perovskite type oxides, Ln_{1-x}AxO_{3-δ}. (Ln = lanthanides, A = Sr, Ca, M = Mn, Co), were studied as cathode materials in solid oxide fuel cells (SOFC) from a view point of compatibility with the solid electrolyte of **yttria** stabilized zirconia (8 mol% Y₂O₃ doped zirconia, 8YSZ). Generally, the pyrochlore, La₂Zr₂O₇, can form at the boundary between the perovskite and 8YSZ. In the . . .

ST perovskite oxide cathode solid **fuel cell**; lanthanide strontium calcium manganese cobalt oxide; compatibility YSZ cathode **fuel cell**

IT **Fuel cell** cathodes
 Overvoltage
 Solid state fuel cells
 Thermal expansion

(perovskite oxides for the cathode in solid oxide fuel cells)

AB The perovskite type oxides, Ln_{1-x}AxO_{3-δ}. (Ln = lanthanides, A = Sr, Ca, M = Mn, Co), were studied as cathode materials in solid oxide fuel cells (SOFC) from a view point of compatibility with the solid electrolyte of **yttria** stabilized zirconia (8 mol% Y₂O₃ doped zirconia, 8YSZ). Generally, the pyrochlore, La₂Zr₂O₇, can form at the boundary between the perovskite and 8YSZ. In the case of Ln_{1-x}SrxMnO_{3-x} (Ln = La, Pr, Nd, Sm, and Gd), the formation of the pyrochlore, Ln₂Zr₂O₇, was suppressed for the perovskites having smaller lanthanoids than La, esp. for the Pr_{1-x}SrxMnO_{3-δ}. and Nd_{1-x}SrxMnO_{3-δ}. systems. The Ln_{1-x}AxCoO_{3-δ}. systems with smaller lanthanoid ions were also effective in suppressing the reaction with 8YSZ. However, the Ln_{1-x}AxCoO_{3-δ}. systems, which are promising cathode materials for a low operating temp. SOFC, have larger thermal expansion rates than 8YSZ. The formation of a solid soln. with Mn in the B-site of the perovskite such as Gd_{1-x}AxMn_{1-y}CoyO_{3-δ}. (A = Sr and Ca)

brought reasonable thermal expansion rates, compatible with 8YSZ and high oxygen redn. catalytic activity.

REFERENCE COUNT: 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 6 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2000:358455 CAPLUS

DOCUMENT NUMBER: 133:20027

TITLE: New cathode materials for solid oxide fuel cells
ruthenium pyrochlores and perovskites

AUTHOR(S): Takeda, Takashi; Kanno, Ryoji; Kawamoto, Yoji; Takeda, Yasuo; Yamamoto, Osamu

CORPORATE SOURCE: Department of Chemistry, Faculty of Science, Kobe
University, Hyogo, 657-8501, Japan

SOURCE: Journal of the Electrochemical Society (2000), 147(5),
1730-1733

CODEN: JESOAN; ISSN: 0013-4651

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The **ruthenium** pyrochlores, $A_2Ru_2O_7 \cdot \Delta$ ($A = Pb, Bi$), and **ruthenium** perovskites, $ARuO_3$ ($A = Ca, Sr$) were characterized as new electrode materials for solid oxide fuel cells. The elec. cond., cathodic polarization, thermal expansion, and reactivity with **yttria**-stabilized zirconia were examd. The pyrochlores showed low cathodic overpotential even at 800.degree., metallic behavior with high elec. cond., and no reaction with **yttria**-stabilized zirconia at 900.degree.. The thermal expansion coeff. of the bismuth pyrochlore was comparable to **yttria**-stabilized (8 mol% Y_2O_3 content) zirconia. The pyrochlores are very attractive for application as cathode materials in a solid oxide **fuel cell** with low operating temp.

ST **fuel cell** cathode ruthenium pyrochlore perovskite;
lead ruthenium pyrochlore perovskite **fuel cell**
cathode; bismuth ruthenium pyrochlore perovskite **fuel**
cell cathode

IT Cathodic polarization

Electric conductivity

Fuel cell cathodes

Solid state fuel cells

Thermal expansion

(cathode materials for solid oxide fuel cells ruthenium pyrochlores and perovskites)

AB The **ruthenium** pyrochlores, $A_2Ru_2O_7 \cdot \Delta$ ($A = Pb, Bi$), and **ruthenium** perovskites, $ARuO_3$ ($A = Ca, Sr$) were characterized as new electrode materials for solid oxide fuel cells. The elec. cond., cathodic polarization, thermal expansion, and reactivity with **yttria**-stabilized zirconia were examd. The pyrochlores showed low cathodic overpotential even at 800.degree., metallic behavior with high elec. cond., and no reaction with **yttria**-stabilized zirconia at 900.degree.. The thermal expansion coeff. of the bismuth pyrochlore was comparable to **yttria**-stabilized (8 mol% Y_2O_3 content) zirconia. The pyrochlores are very attractive for application as cathode materials in a solid oxide **fuel cell** with low operating temp.

REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 7 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 2000:24538 CAPLUS

DOCUMENT NUMBER: 132:197829

TITLE: Chemical compatibility of rare earth cobaltite
perovskites with YSZ

AUTHOR(S): Tu, H. Y.; Lu, X. H.; Wen, T. L.; Takeda, Y.;

CORPORATE SOURCE: Ichikawa, T.; Imanishi, N.; Yamamoto, O.
 Shanghai Institute of Ceramics, Chinese Academy of
 Sciences, Shanghai, 200050, Peop. Rep. China
 SOURCE: Journal of the Australasian Ceramic Society (1999),
 35(1/2), 1-6
 CODEN: JAUSEL; ISSN: 1018-6689
 PUBLISHER: Australasian Ceramic Society
 DOCUMENT TYPE: Journal
 LANGUAGE: English
 AB . . . chem. compatibility of perovskites in $\text{Ln}_{1-x}\text{Sr}_x\text{CoO}_{3-\delta}$ ($\text{Ln} = \text{Sm}, \text{Dy}$), $\text{Ln}_{0.4}\text{Sr}_{0.6}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-\delta}$ ($\text{Ln} = \text{La}, \text{Pr}, \text{Nd}, \text{Sm}, \text{Gd}$), $\text{Gd}_{0.8}\text{Ca}_{0.2}\text{Co}_{1-x}\text{Mn}_x\text{O}_{3-\delta}$ with 8 mol% yttria stabilized zirconia (8YSZ) has been studied. Powder mixts. of these perovskites and 8YSZ have been annealed at different temps. for 96h. 8YSZ/ $\text{Ln}_{0.4}\text{Sr}_{0.6}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-\delta}$ ($\text{Ln} = \text{La}, \text{Pr}, \text{Nd}, \text{Sm}, \text{Gd}$) at 900.degree.. No reaction product has been detected in 8YSZ/ $\text{Gd}_{0.8}\text{Ca}_{0.2}\text{Co}_{1-x}\text{Mn}_x\text{O}_{3-\delta}$ by XRD. However, significant diffusion of Co into 8YSZ has been found by EDX at the interface of 8YSZ/ $\text{Gd}_{0.8}\text{Ca}_{0.2}\text{Co}_{0.6}\text{Mn}_{0.4}\text{O}_{3-\delta}$ after annealing at 1200.degree. for 24h. The.
 ST chem compatibility rare earth cobaltite perovskite yttria zirconia; solid oxide fuel cell catalytic activity oxygen perovskite reaction; annealing interface bond valence model reaction perovskite yttria zirconia
 AB Rare earth cobaltite perovskites are interesting cathode materials for the reduced temp. SOFC because of their high catalytic activity for O redn. The chem. compatibility of perovskites in $\text{Ln}_{1-x}\text{Sr}_x\text{CoO}_{3-\delta}$ ($\text{Ln} = \text{Sm}, \text{Dy}$), $\text{Ln}_{0.4}\text{Sr}_{0.6}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-\delta}$ ($\text{Ln} = \text{La}, \text{Pr}, \text{Nd}, \text{Sm}, \text{Gd}$), $\text{Gd}_{0.8}\text{Ca}_{0.2}\text{Co}_{1-x}\text{Mn}_x\text{O}_{3-\delta}$ with 8 mol% yttria stabilized zirconia (8YSZ) has been studied. Powder mixts. of these perovskites and 8YSZ have been annealed at different temps. for 96h in air. As the main reaction product, SrZrO_3 has been found in 8YSZ/ $\text{Ln}_{1-x}\text{Sr}_x\text{CoO}_{3-\delta}$ ($\text{Ln} = \text{Sm}, \text{Dy}$) with high Sr content and 8YSZ/ $\text{Ln}_{0.4}\text{Sr}_{0.6}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-\delta}$ ($\text{Ln} = \text{La}, \text{Pr}, \text{Nd}, \text{Sm}, \text{Gd}$) at 900.degree.. No reaction product has been detected in 8YSZ/ $\text{Gd}_{0.8}\text{Ca}_{0.2}\text{Co}_{1-x}\text{Mn}_x\text{O}_{3-\delta}$ by XRD. However, significant diffusion of Co into 8YSZ has been found by EDX at the interface of 8YSZ/ $\text{Gd}_{0.8}\text{Ca}_{0.2}\text{Co}_{0.6}\text{Mn}_{0.4}\text{O}_{3-\delta}$ after annealing at 1200.degree. for 24h. The bond-valence model has been used to discuss the chem. compatibility of the different perovskites with 8YSZ.
 REFERENCE COUNT: 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 8 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN
 ACCESSION NUMBER: 1999:511767 CAPLUS
 DOCUMENT NUMBER: 131:146867
 TITLE: $\text{Gd}_{1-x}\text{A}_x\text{Co}_{1-y}\text{Mn}_y\text{O}_3$ ($\text{A} = \text{Sr}, \text{Ca}$) as a cathode for the SOFC
 AUTHOR(S): Phillipps, M. B.; Sammes, N. M.; Yamamoto, O.
 CORPORATE SOURCE: Department of Technology, The University of Waikato, Hamilton, N. Z.
 SOURCE: Solid State Ionics (1999), 123(1-4), 131-138
 CODEN: SSIOD3; ISSN: 0167-2738
 PUBLISHER: Elsevier Science B.V.
 DOCUMENT TYPE: Journal
 LANGUAGE: English
 AB The $\text{Gd}_{1-x}\text{A}_x\text{Co}_{1-y}\text{Mn}_y\text{O}_3$ ($\text{A} = \text{Sr}, \text{Ca}$) system was examd. as an electrode for use in a solid oxide fuel cell. Particular compns. displayed reasonable performances of elec. cond. and cathodic polarization (using an 8 mol% yttria-stabilized zirconia (YSZ) electrolyte system). Mn rich compns. showed thermal expansion compatibility with the YSZ electrolyte. Reactivity with YSZ revealed only. . . temps. allowing dissoln. of the unstable pyrochlore, into the YSZ lattice. SrZrO_3 formation was noted at lower temps. for high Co-contg. compns., with reaction occurring at higher temps. for

compsns. contg. even less Co.

ST solid oxide **fuel cell** cathode; gadolinium strontium
calcium cobalt manganese oxide

IT Cathodic polarization
Electric conductivity
Fuel cell cathodes
Thermal expansion
(Gd_{1-x}AxCo_{1-y}MnyO₃ (A = Sr, Ca) as a cathode for the solid oxide fuel
cells)

AB The Gd_{1-x}AxCo_{1-y}MnyO₃ (A = Sr, Ca) system was examd. as an electrode for
use in a solid oxide **fuel cell**. Particular compns.
displayed reasonable performances of elec. cond. and cathodic polarization
(using an 8 mol% **yttria**-stabilized zirconia (YSZ)
electrolyte system). Mn rich compns. showed thermal expansion
compatibility with the YSZ electrolyte. Reactivity with YSZ revealed only
small amts. of Gd₂Zr₂O₇ formation resulting after annealing at
1000.degree.C, with higher annealing temps. allowing dissoln. of the
unstable pyrochlore, into the YSZ lattice. SrZrO₃ formation was noted at
lower temps. for high Co-contg. compns., with reaction occurring
at higher temps. for compns. contg. even less Co.

REFERENCE COUNT: 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 9 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1999:404580 CAPLUS

DOCUMENT NUMBER: 131:104493

TITLE: Gd_{1-x}AxMn_{1-y}CoyO₃-.delta. (A = Sr, Ca) as a cathode
for solid-oxide fuel cells

AUTHOR(S): Tu, H. Y.; Phillipps, M. B.; Takeda, Y.; Ichikawa, T.;
Imanishi, N.; Sammes, N. M.; Yamamoto, O.

CORPORATE SOURCE: Department of Chemistry, Faculty of Engineering, Mie
University, Mie, 514-8507, Japan

SOURCE: Journal of the Electrochemical Society (1999), 146(6),
2085-2091
CODEN: JESOAN; ISSN: 0013-4651

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB . . . examd. as a cathode for use in solid oxide fuel cells. The elec.
cond. and cathodic polarization on an 8 mol% **yttria**
-stabilized zirconia (8YSZ) electrolyte had acceptable values for certain
compns. Thermal expansion measurements were taken, showing compatibility
of Mn-rich compns. with the 8YSZ electrolyte. Reactivity with 8YSZ
revealed the formation of SrZrO₃ or CaZrO₃ at lower temps. for high
Co contg. compns. No reaction product was detected between
Gd_{0.8}Ca_{0.2}Mn_{1-y}CoyO₃-.delta. and 8YSZ. However, significant diffusion of
Co into 8YSZ was found at the Gd_{0.8}Ca_{0.2}Mn_{0.4}Co_{0.6}O₃-.delta./8YSZ
interface after annealing at 1200.degree. for 24 h.

ST cathode solid oxide **fuel cell**; gadolinium strontium
manganese cobalt oxide cathode; calcium gadolinium manganese cobalt oxide
cathode

IT Cathodic polarization
Electric conductivity
Fuel cell cathodes
Thermal expansion
(Gd_{1-x}AxMn_{1-y}CoyO₃-.delta. (A = Sr, Ca) as a cathode for solid-oxide
fuel cells)

AB The Gd_{1-x}AxMn_{1-y}CoyO₃-.delta. (A = Sr,Ca) systems were examd. as a cathode
for use in solid oxide fuel cells. The elec. cond. and cathodic
polarization on an 8 mol% **yttria**-stabilized zirconia
(8YSZ) electrolyte had acceptable values for certain compns. Thermal
expansion measurements were taken, showing compatibility of Mn-rich
compns. with the 8YSZ electrolyte. Reactivity with 8YSZ revealed the
formation of SrZrO₃ or CaZrO₃ at lower temps. for high Co contg.

compsns. No reaction product was detected between $\text{Gd}_{0.8}\text{Ca}_{0.2}\text{Mn}_{1-y}\text{Co}_y\text{O}_{3-\delta}$ and 8YSZ. However, significant diffusion of Co into 8YSZ was found at the $\text{Gd}_{0.8}\text{Ca}_{0.2}\text{Mn}_{0.4}\text{Co}_{0.6}\text{O}_{3-\delta}$ /8YSZ interface after annealing at 1200.degree. for 24 h.

REFERENCE COUNT: 20 THERE ARE 20 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 10 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1999:342876 CAPLUS

DOCUMENT NUMBER: 131:61097

TITLE: Cathodic activity and interfacial stability of $\text{Y}_{0.8}\text{Ca}_{0.2}\text{Co}_{1-x}\text{Fe}_x\text{O}_3/\text{YSZ}$ electrodes for solid oxide fuel cells

AUTHOR(S): Lee, Hee Y.; Jang, Jong H.; Oh, Seung M.

CORPORATE SOURCE: Division of Chemical Engineering and Institute of Chemical Process, College of Engineering, Seoul National University, Seoul, 151-742, S. Korea

SOURCE: Journal of the Electrochemical Society (1999), 146(5), 1707-1711

CODEN: JESOAN; ISSN: 0013-4651

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The Fe-doped cobaltates, $\text{Y}_{0.8}\text{Ca}_{0.2}\text{Co}_{1-x}\text{Fe}_x\text{O}_{3-\delta}$ ($x = 0.1-0.7$), were prepd. and their high-temp. phase stability and cathodic activity were investigated. The perovskite/**yttria**-stabilized zirconia (YSZ) electrodes were fabricated via a silk printing technique. It was found that the undoped cobaltate ($x = 0$) is so thermally unstable that the prepn. of pure perovskite phase was unsuccessful. The partial Fe-doping to Co ($x = 0.1-0.7$), however, gave us highly cryst. perovskite powders of an orthorhombic lattice. Among those samples of $x = \dots$ The thermal expansion coeff. of this material ($10.5 \times 10^{-6} \text{ cm/cm-K}$ at 25-10000) was very close to that of 8 mol% YSZ ($10.8 \times 10^{-6} \text{ cm/cm-K}$). As a result of interfacial reaction between $\text{Y}_{0.8}\text{Ca}_{0.2}\text{Co}_{0.7}\text{Fe}_{0.3}\text{O}_{3-\delta}$ and YSZ electrolyte, a spinel-type oxide was.

ST fuel cell interfacial stability cathode electrolyte

IT Fuel cell cathodes

Fuel cell electrolytes

Solid state fuel cells

Thermal expansion

(cathodic activity and interfacial stability of $\text{Y}_{0.8}\text{Ca}_{0.2}\text{Co}_{1-x}\text{Fe}_x\text{O}_3/\text{yttria}$ -stabilized ZrO_2 electrodes for solid oxide fuel cells)

AB The Fe-doped cobaltates, $\text{Y}_{0.8}\text{Ca}_{0.2}\text{Co}_{1-x}\text{Fe}_x\text{O}_{3-\delta}$ ($x = 0.1-0.7$), were prepd. and their high-temp. phase stability and cathodic activity were investigated. The perovskite/**yttria**-stabilized zirconia (YSZ) electrodes were fabricated via a silk printing technique. It was found that the undoped cobaltate ($x = 0$) is so thermally unstable that the prepn. of pure perovskite phase was unsuccessful. The partial Fe-doping to Co ($x = 0.1-0.7$), however, gave us highly cryst. perovskite powders of an orthorhombic lattice. Among those samples of $x = 0.1-0.7$, the $\text{Y}_{0.8}\text{Ca}_{0.2}\text{Co}_{0.7}\text{Fe}_{0.3}\text{O}_{3-\delta}$ showed the best cathodic activity which is superior to $\text{La}_{0.9}\text{Sr}_{0.1}\text{MnO}_3$. The thermal expansion coeff. of this material ($10.5 \times 10^{-6} \text{ cm/cm-K}$ at 25-10000) was very close to that of 8 mol% YSZ ($10.8 \times 10^{-6} \text{ cm/cm-K}$). As a result of interfacial reaction between $\text{Y}_{0.8}\text{Ca}_{0.2}\text{Co}_{0.7}\text{Fe}_{0.3}\text{O}_{3-\delta}$ and YSZ electrolyte, a spinel-type oxide was produced. But the interfacial product formation proceeded mainly during the electrode adhesion period (1200.degree.) whereas its growth during the cell operation (900-1000.degree.) was negligible.

REFERENCE COUNT: 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 11 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1998:283914 CAPLUS
DOCUMENT NUMBER: 128:324019
TITLE: Redox-active impurity ions in solid electrolytes and their influence on transport properties
AUTHOR(S): Sasaki, K.; Murugaraj, P.; Haseidl, M.; Maier, J.
CORPORATE SOURCE: Max-Planck-Institut fur Festkorperforschung, Stuttgart, D-70569, Germany
SOURCE: Proceedings - Electrochemical Society (1997), 97-40(Solid Oxide Fuel Cells), 1190-1202
CODEN: PESODO; ISSN: 0161-6374
PUBLISHER: Electrochemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English

AB . . . discussed. As long as the content of these impurities is negligible with respect to the aliovalent oxide content (e.g., the yttria concn. in stabilized-ZrO₂), the equil. concns. of electrons and holes are not affected by the impurities. However, they may have . . . ions of variable charges. The valence state and its change of doped transition metal ions (Ti, V, Cr, Mn, Fe, Co, Ni, Cu) and selected rare earth ions (Ce, Pr, Gd) in 9.5 mol%Y₂O₃-stabilized ZrO₂ single crystals as a model solid electrolyte are identified by ESR (EPR/ESR) and optical absorption spectroscopy (NIR, VIS, UV) . . .
ST solid electrolyte fuel cell redox impurity; yttria stabilized zirconia electrolyte impurity
IT ESR (electron spin resonance)
Fuel cell electrolytes
Solid state fuel cells
(redox-active impurity ions in solid electrolytes and their influence on transport properties)

AB The importance of redox-active impurities in solid electrolytes is discussed. As long as the content of these impurities is negligible with respect to the aliovalent oxide content (e.g., the yttria concn. in stabilized-ZrO₂), the equil. concns. of electrons and holes are not affected by the impurities. However, they may have a considerable influence on the chem. diffusion of oxygen by the internal source/sink effects as well as on the electronic cond. directly under conditions where the interaction with the gas phase is frozen in. Defect chem. and transport equations for solid electrolytes are given including the ionization equil. reactions of ions of variable charges. The valence state and its change of doped transition metal ions (Ti, V, Cr, Mn, Fe, Co, Ni, Cu) and selected rare earth ions (Ce, Pr, Gd) in 9.5 mol%Y₂O₃-stabilized ZrO₂ single crystals as a model solid electrolyte are identified by ESR (EPR/ESR) and optical absorption spectroscopy (NIR, VIS, UV). The single crystals, annealed at 800.degree. in a po₂ range from 1.0 down to 10-20 bar, are used in this study. The redox-active impurity ions in the solid electrolyte are specified by both methods.

REFERENCE COUNT: 31 THERE ARE 31 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 12 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1998:283200 CAPLUS
DOCUMENT NUMBER: 128:324002
TITLE: Chemical compatibility of LaFeO₃ based perovskites with yttria stabilized zirconia
AUTHOR(S): Kindermann, L.; Hilpert, K.
CORPORATE SOURCE: Institute for Materials in Energy Systems, Research Centre Julich, Julich, 52425, Germany
SOURCE: Proceedings - Electrochemical Society (1997), 97-40(Solid Oxide Fuel Cells), 773-782
CODEN: PESODO; ISSN: 0161-6374
PUBLISHER: Electrochemical Society
DOCUMENT TYPE: Journal
LANGUAGE: English

AB . . . as cathode materials for advanced SOFC. Physicochem. compatibilities of 63 compns., $(\text{La}_{0.6}\text{A}_{0.4})\text{zFe}_{0.8}\text{M}_{0.2}\text{O}_{3-\delta}$. (A = Sr, Ca; M = Cr, Mn, **Co**, Ni; z = 0.9, 1.0) and $(\text{La}_{1-x}\text{Srx})\text{zFe}_{1-y}\text{MnyO}_{3-\delta}$. (x = 0-0.4; y = 0-1; z = 0.9, 0.95, 1.0), with the solid electrolyte zirconia-**yttria** (8 mol% Y_2O_3) were investigated. Powder mixts. of these perovskites were annealed at 1000.degree., 1100.degree. and 1400.degree. for time periods up to. . . of SrZrO_3 whereas $\text{La}_2\text{Zr}_2\text{O}_7$ was detected in powder mixts. with high La concn. Samples with Ca on A site and **Co** or Ni on B site showed the formation of a CaZrO_3 phase while a garnet phase was obsd. with M.

ST **fuel cell** cathode iron lanthanum oxide; perovskite
yttria zirconia cathode **fuel cell**

IT **Fuel cell** cathodes

Fuel cell electrolytes

Solid state fuel cells

(chem. compatibility of LaFeO_3 based perovskites with yttria stabilized zirconia)

AB Perovskites on the basis of LaFeO_3 are of interest as cathode materials for advanced SOFC. Physicochem. compatibilities of 63 compns., $(\text{La}_{0.6}\text{A}_{0.4})\text{zFe}_{0.8}\text{M}_{0.2}\text{O}_{3-\delta}$. (A = Sr, Ca; M = Cr, Mn, **Co**, Ni; z = 0.9, 1.0) and $(\text{La}_{1-x}\text{Srx})\text{zFe}_{1-y}\text{MnyO}_{3-\delta}$. (x = 0-0.4; y = 0-1; z = 0.9, 0.95, 1.0), with the solid electrolyte zirconia-**yttria** (8 mol% Y_2O_3) were investigated. Powder mixts. of these perovskites were annealed at 1000.degree., 1100.degree. and 1400.degree. for time periods up to 3600 h. After quenching, the samples were analyzed by XRD, SEM/EDX and TEM/EDX for identification of the reaction products. High Sr content on A site leads to the formation of SrZrO_3 whereas $\text{La}_2\text{Zr}_2\text{O}_7$ was detected in powder mixts. with high La concn. Samples with Ca on A site and **Co** or Ni on B site showed the formation of a CaZrO_3 phase while a garnet phase was obsd. with M = Cr or Mn. In some cases also monoclinic zirconia was found. Some compns. showed no reaction products. They might be possible candidates for use as cathode materials in solid oxide fuel cells.

REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 13 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1998:283184 CAPLUS

DOCUMENT NUMBER: 128:310434

TITLE: Influence of sintering characteristics on component curvature of electrolyte-coated anode substrates

AUTHOR(S): Steinbrech, R. W.; Caron, A.; Blals, G.; Dias, F.

CORPORATE SOURCE: Forschungszentrum Julich GmbH, Institut fur Werkstoffe der Energietechnik, Julich, D-52425, Germany

SOURCE: Proceedings - Electrochemical Society (1997), 97-40 (Solid Oxide Fuel Cells), 727-736

CODEN: PESODO; ISSN: 0161-6374

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB . . . for lower operation temp. Such electrolyte/anode components are fabricated by casting the electrolyte material onto pre-sintered porous anode substrates and **co-firing** the bi-layered component. Due to different temps. for the onset of sintering and different amts. of shrinkage between electrolyte and. . . the effect, specimen strips were prepd. which could be vertically suspended in a sintering furnace. The shape changes during the **co-firing** were monitored in situ using a high temp. telescope system with microscopic resoln. Expts. are presented for 8 mol% **yttria**-stabilized zirconia (8YSZ) electrolyte films on NiO -8YSZ anode composites during sintering at 1400.degree.. Strategies for obtaining flat electrolyte/anode components are discussed.

ST **fuel cell** electrolyte coated anode sintering

IT **Fuel cell anodes**
Fuel cell electrolytes
Sintering
Solid state fuel cells
(influence of sintering characteristics on component curvature of electrolyte-coated anode substrates)

AB Thin electrolyte films (10-20 .mu.m) on anode material supports are considered as an attractive design concept for solid oxide fuel cells (SOFC) for lower operation temp. Such electrolyte/anode components are fabricated by casting the electrolyte material onto pre-sintered porous anode substrates and **co-firing** the bi-layered component. Due to different temps. for the onset of sintering and different amts. of shrinkage between electrolyte and anode material, curvature of the component is almost unavoidable. To quantify the effect, specimen strips were prepd. which could be vertically suspended in a sintering furnace. The shape changes during the **co-firing** were monitored in situ using a high temp. telescope system with microscopic resoln. Expts. are presented for 8 mol% **yttria**-stabilized zirconia (8YSZ) electrolyte films on NiO-8YSZ anode composites during sintering at 1400.degree.. Strategies for obtaining flat electrolyte/anode components are discussed.

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 14 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN
ACCESSION NUMBER: 1997:461272 CAPLUS
DOCUMENT NUMBER: 127:178747
TITLE: Chemical compatibility of LaFeO3-base perovskite structures at the interface of the electrolyte of a solid oxide **fuel cell** (SOFC)
AUTHOR(S): Kindermann, L.; Hilpert, K.; Nickel, H.
CORPORATE SOURCE: Institut Werkstoffe Energietechnik, Forschungszentrum Julich G.m.b.H., Juelich, D-52425, Germany
SOURCE: Berichte des Forschungszentrums Juelich (1997), Juel-3382, 1-129 pp.
CODEN: FJBEE5; ISSN: 0366-0885
DOCUMENT TYPE: Report
LANGUAGE: German

TI Chemical compatibility of LaFeO3-base perovskite structures at the interface of the electrolyte of a solid oxide **fuel cell** (SOFC)

AB For reducing the operation temp. of a solid oxide **fuel cell** from 1000.degree. to 850.degree. the development of a new and advanced cathode material is a necessary demand. The investigation of . . oxygen vacancy formation were carried out. Physicochem. compatibilities of different compns., (La0.6A0.4)zFe0.8Mo.2O3 (A = Sr, Ca; M = Cr, Mn, **Co**, Ni; z = 0.9, 1.0) and (La1-xSrx)zFe1-yMnyO3 (x = 0-0.4; y = 0-1; z = 0.9, 0.95, 1.0), with the solid electrolyte zirconia-**yttria** (8 mol% Y2O3) were investigated. Powder mixts. of these perovskites were annealed at 1000.degree., 1100.degree. and 1400.degree. for time periods up to. . . of SrZrO3 whereas La2Zr2O7 was detected in powder mixts. with high La concn. Samples with Ca on A site and **Co** or Ni on B site showed the formation of a CaZrO3 phase while a garnet phase was obsd. with M. . . LaFeO3 based perovskites. Some suggestions were made concerning an electrolyte with a modified compn. as well as different dopants namely **Co**, Zr or Ir.

ST **fuel cell** cathode electrolyte chem compatibility;
perovskite **yttria** zirconia electrolyte interface; lanthanum iron oxide **fuel cell** cathode; iridium doping perovskite **fuel cell** cathode

IT Ceramics
Electrode-electrolyte interface
Fuel cell cathodes
Fuel cell electrolytes

Perovskite-type crystals

(chem. compatibility of LaFeO₃-base perovskite cathodes at interface of YSZ electrolyte of a solid oxide fuel cell)

IT Polarization resistance

Thermal expansion

(of LaFeO₃-base perovskite fuel cell cathodes)

IT 12022-43-4, Iron lanthanum oxide (FeLaO₃) 12031-12-8, Lanthanum manganese oxide (LaMnO₃) 12186-38-8, Iron lanthanum manganese oxide (Fe_{0.5}LaMn_{0.5}O₃) 108916-21-8, Lanthanum manganese strontium oxide (La_{0.6}MnSr_{0.4}O₃) 108916-22-9, Lanthanum manganese strontium oxide (La_{0.8}MnSr_{0.2}O₃) 109546-91-0, Iron lanthanum strontium oxide (FeLa_{0.8}Sr_{0.2}O₃) 110641-92-4, Iron lanthanum manganese strontium oxide (Fe_{0.2}La_{0.7}Mn_{0.8}Sr_{0.3}O₃) 110758-52-6, Iron lanthanum strontium oxide (FeLa_{0.6}Sr_{0.4}O₃) 120949-38-4, Iron lanthanum manganese strontium oxide (Fe_{0.5}La_{0.7}Mn_{0.5}Sr_{0.3}O₃) 133878-22-5, Lanthanum manganese strontium oxide (La_{0.66}MnSr_{0.28}O₃) 148595-66-8, Cobalt iron lanthanum strontium oxide (Co_{0.2}Fe_{0.8}La_{0.6}Sr_{0.4}O₃) 158307-83-6, Calcium iron lanthanum manganese oxide (Ca_{0.4}Fe_{0.8}La_{0.6}Mn_{0.2}O₃) 158307-84-7, Iron lanthanum manganese strontium oxide (Fe_{0.8}La_{0.6}Mn_{0.2}Sr_{0.4}O₃) 159423-43-5, Calcium cobalt iron lanthanum oxide (Ca_{0.4}Co_{0.2}Fe_{0.8}La_{0.6}O₃) 164723-14-2, Iron lanthanum manganese strontium oxide (Fe_{0.2}La_{0.8}Mn_{0.8}Sr_{0.2}O₃) 166188-05-2, Calcium iron lanthanum nickel oxide (Ca_{0.4}Fe_{0.8}La_{0.6}Ni_{0.2}O₃) 166188-06-3, Calcium iron lanthanum nickel oxide (Ca_{0.36}Fe_{0.8}La_{0.54}Ni_{0.2}O₃) 166188-07-4, Calcium chromium iron lanthanum oxide (Ca_{0.36}Cr_{0.2}Fe_{0.8}La_{0.54}O₃) 166188-08-5, Calcium iron lanthanum manganese oxide (Ca_{0.36}Fe_{0.8}La_{0.54}Mn_{0.2}O₃) 166188-09-6, Calcium cobalt iron lanthanum oxide (Ca_{0.36}Co_{0.2}Fe_{0.8}La_{0.54}O₃) 177080-58-9, Iron lanthanum manganese strontium oxide (Fe_{0.5}La_{0.6}Mn_{0.5}Sr_{0.4}O₃) 184045-31-6, Chromium iron lanthanum strontium oxide (Cr_{0.2}Fe_{0.8}La_{0.6}Sr_{0.4}O₃) 184045-32-7, Iron lanthanum nickel strontium oxide (Fe_{0.8}La_{0.6}Ni_{0.2}Sr_{0.4}O₃) 184045-33-8, Chromium iron lanthanum strontium oxide (Cr_{0.2}Fe_{0.8}La_{0.54}Sr_{0.36}O₃) 184045-34-9, Iron lanthanum manganese strontium oxide (Fe_{0.8}La_{0.54}Mn_{0.2}Sr_{0.36}O₃) 184045-35-0, Cobalt iron lanthanum strontium oxide (Co_{0.2}Fe_{0.8}La_{0.54}Sr_{0.36}O₃) 184045-36-1, Iron lanthanum nickel strontium oxide (Fe_{0.8}La_{0.54}Ni_{0.2}Sr_{0.36}O₃) 184839-68-7, Iron lanthanum manganese strontium oxide (Fe_{0.2}La_{0.86}Mn_{0.8}Sr_{0.1}O₃) 184839-70-1, Iron lanthanum manganese strontium oxide (Fe_{0.5}La_{0.86}Mn_{0.5}Sr_{0.1}O₃) 184839-72-3, Iron lanthanum manganese strontium oxide (Fe_{0.5}La_{0.66}Mn_{0.5}Sr_{0.28}O₃) 185147-80-2, Iron lanthanum manganese strontium oxide (Fe_{0.7}La_{0.7}Mn_{0.3}Sr_{0.3}O₃) 185147-81-3, Iron lanthanum manganese strontium oxide (Fe_{0.7}La_{0.76}Mn_{0.3}Sr_{0.19}O₃) 185147-82-4, Iron lanthanum manganese strontium oxide (Fe_{0.5}La_{0.72}Mn_{0.5}Sr_{0.18}O₃) 185147-83-5, Iron lanthanum manganese strontium oxide (Fe_{0.2}La_{0.76}Mn_{0.8}Sr_{0.19}O₃) 185147-84-6, Iron lanthanum manganese oxide (Fe_{0.2}La_{0.95}Mn_{0.8}O₃) 185147-85-7, Iron lanthanum manganese strontium oxide (Fe_{0.7}La_{0.86}Mn_{0.3}Sr_{0.1}O₃) 185147-86-8, Iron lanthanum manganese strontium oxide (Fe_{0.7}La_{0.66}Mn_{0.3}Sr_{0.28}O₃) 185147-87-9, Iron lanthanum manganese strontium oxide (Fe_{0.2}La_{0.66}Mn_{0.8}Sr_{0.28}O₃) 185147-88-0, Iron lanthanum manganese strontium oxide (Fe_{0.7}La_{0.63}Mn_{0.3}Sr_{0.27}O₃) 185148-62-3, Iron lanthanum manganese strontium oxide (Fe_{0.8}La_{0.72}Mn_{0.2}Sr_{0.18}O₃) 188425-10-7, Calcium chromium iron lanthanum oxide (Ca_{0.4}Cr_{0.2}Fe_{0.8}La_{0.6}O₃) 190203-97-5, Iron lanthanum manganese strontium oxide (Fe_{0.5}La_{0.63}Mn_{0.5}Sr_{0.27}O₃) 190203-98-6, Iron lanthanum manganese strontium oxide (Fe_{0.2}La_{0.63}Mn_{0.8}Sr_{0.27}O₃) 190203-99-7, Iron lanthanum manganese strontium oxide (Fe_{0.2}La_{0.81}Mn_{0.8}Sr_{0.14}O₃) 190204-00-3, Iron lanthanum manganese strontium oxide (Fe_{0.2}La_{0.71}Mn_{0.8}Sr_{0.24}O₃) 190204-01-4, Iron lanthanum manganese strontium oxide (Fe_{0.5}La_{0.76}Mn_{0.5}Sr_{0.14}O₃) 190204-02-5, Lanthanum manganese strontium oxide (La_{0.71}MnSr_{0.24}O₃) 190204-03-6, Iron lanthanum manganese strontium oxide (Fe_{0.1}La_{0.71}Mn_{0.9}Sr_{0.24}O₃) 191729-80-3, Cobalt iron lanthanum manganese strontium oxide (Co_{0.05}Fe_{0.5}La_{0.7}Mn_{0.45}Sr_{0.3}O₃) 193412-94-1 193412-95-2 193412-96-3 193412-97-4, Iron lanthanum manganese strontium oxide (Fe_{0.2}La_{0.76}Mn_{0.8}Sr_{0.14}O₃) 193412-98-5 193412-99-6,

Iron lanthanum manganese strontium oxide ($\text{Fe}_{0.5}\text{La}_{0.76}\text{Mn}_{0.5}\text{Sr}_{0.19}\text{O}_3$)
 193413-00-2 193413-01-3, Iron lanthanum manganese strontium oxide
 ($\text{Fe}_{0.2}\text{La}_{0.9}\text{Mn}_{0.8}\text{Sr}_{0.1}\text{O}_3$) 193413-02-4, Iron lanthanum manganese strontium
 oxide ($\text{Fe}_{0.5}\text{La}_{0.9}\text{Mn}_{0.5}\text{Sr}_{0.1}\text{O}_3$) 193413-03-5, Iron lanthanum manganese
 strontium oxide ($\text{Fe}_{0.5}\text{La}_{0.8}\text{Mn}_{0.5}\text{Sr}_{0.2}\text{O}_3$) 193413-04-6, Iron lanthanum
 manganese strontium oxide ($\text{Fe}_{0.7}\text{La}_{0.9}\text{Mn}_{0.3}\text{Sr}_{0.1}\text{O}_3$) 193413-05-7, Iron
 lanthanum manganese strontium oxide ($\text{Fe}_{0.7}\text{La}_{0.8}\text{Mn}_{0.3}\text{Sr}_{0.2}\text{O}_3$)
 193413-06-8, Iron lanthanum manganese strontium oxide
 ($\text{Fe}_{0.2}\text{La}_{0.81}\text{Mn}_{0.8}\text{Sr}_{0.09}\text{O}_3$) 193413-07-9, Iron lanthanum manganese
 strontium oxide ($\text{Fe}_{0.5}\text{La}_{0.81}\text{Mn}_{0.5}\text{Sr}_{0.09}\text{O}_3$) 193413-08-0, Iron lanthanum
 manganese strontium oxide ($\text{Fe}_{0.7}\text{La}_{0.81}\text{Mn}_{0.3}\text{Sr}_{0.09}\text{O}_3$) 193413-09-1, Iron
 lanthanum manganese strontium oxide ($\text{Fe}_{0.7}\text{La}_{0.72}\text{Mn}_{0.3}\text{Sr}_{0.18}\text{O}_3$)
 193413-10-4 193413-11-5 193413-12-6

RL: DEV (Device component use); PEP (Physical, engineering or chemical
 process); PRP (Properties); PROC (Process); USES (Uses)

(chem. compatibility of LaFeO_3 -base perovskite cathodes at interface of
 YSZ electrolyte of a solid oxide **fuel cell**)

IT 7439-88-5, Iridium, uses

RL: MOA (Modifier or additive use); USES (Uses)

(chem. compatibility of LaFeO_3 -base perovskite cathodes at interface of
 YSZ electrolyte of a solid oxide **fuel cell**)

IT 64417-98-7, Yttrium zirconium oxide

RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM
 (Technical or engineered material use); PROC (Process); USES (Uses)

(chem. compatibility of LaFeO_3 -base perovskite cathodes at interface of
 YSZ electrolyte of a solid oxide **fuel cell**)

IT 1314-23-4, Zirconia, uses

RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM
 (Technical or engineered material use); PROC (Process); USES (Uses)

(yttria-stabilized; chem. compatibility of LaFeO_3 -base perovskite
 cathodes at interface of YSZ electrolyte of a solid oxide **fuel
 cell**)

IT 1314-36-9, Yttria, uses

RL: PEP (Physical, engineering or chemical process); PRP (Properties); TEM
 (Technical or engineered material use); PROC (Process); USES (Uses)

(zirconia contg.; chem. compatibility of LaFeO_3 -base perovskite
 cathodes at interface of YSZ electrolyte of a solid oxide **fuel
 cell**)

AB For reducing the operation temp. of a solid oxide **fuel**

cell from 1000.degree. to 850.degree. the development of a new and
 advanced cathode material is a necessary demand. The investigation of the
 chem. stability and compatibility of a new material based on LaFeO_3 was of
 main interest in the work. In addn. the elec. properties and the thermal
 expansion coeff. of some selected compns. were investigated. Also expts.
 to det. the oxygen vacancy formation were carried out. Physicochem.
 compatibilities of different compns., $(\text{La}_{0.6}\text{A}_{0.4})\text{zFe}_{0.8}\text{Mo}_{0.2}\text{O}_3$ (A = Sr, Ca;
 M = Cr, Mn, Co, Ni; z = 0.9, 1.0) and $(\text{La}_{1-x}\text{Sr}_x)\text{zFe}_{1-y}\text{Mn}_y\text{O}_3$ (x =
 0-0.4; y = 0-1; z = 0.9, 0.95, 1.0), with the solid electrolyte zirconia-
 yttria (8 mol% Y_2O_3) were investigated. Powder mixts.
 of these perovskites were annealed at 1000.degree., 1100.degree. and
 1400.degree. for time periods up to 3600 h in a high temp. furnace. After
 quenching, the samples were analyzed by XRD, SEM/EDX and TEM/EDX for
 identification of the reaction products. Inter-diffusion processes
 between the perovskite material and the electrolyte lead to the formation
 of new phases. High Sr content on A site lead to the formation of SrZrO_3
 whereas $\text{La}_2\text{Zr}_2\text{O}_7$ was detected in powder mixts. with high La concn.
 Samples with Ca on A site and Co or Ni on B site showed the
 formation of a CaZrO_3 phase while a garnet phase was obsd. with M = Cr or
 Mn. In some cases also monoclinic zirconia was found. Some compns.
 showed no reaction products. Based on these results it was possible to
 work out different stability criteria for LaFeO_3 based perovskites. Some
 suggestions were made concerning an electrolyte with a modified compn. as
 well as different dopants namely Co, Zr or Ir.

L1 ANSWER 15 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1997:355784 CAPLUS

DOCUMENT NUMBER: 127:68419

TITLE: Sputtered La_{0.5}Sr_{0.5}MnO₃-yttria stabilized zirconia composite film electrodes for SOFC

AUTHOR(S): Hayashi, Koichiro; Yamamoto, Osamu; Nishigaki, Yasuhiro; Minoura, Hideki

CORPORATE SOURCE: Gifu Prefectural Industrial Research Technical Center, 47 Kitaoyobi, Kasamatu, Hashima, Gifu, Japan

SOURCE: Solid State Ionics (1997), 98(1,2), 49-55

CODEN: SSIOD3; ISSN: 0167-2738

PUBLISHER: Elsevier

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The La_{0.5}Sr_{0.5}MnO₃ (SLM)-8 mol %yttria stabilized cubic zirconia (YSZ) composite film electrodes were prepd. by co-sputtering SLM and YSZ under an argon and oxygen mixed atm. The elec. cond. and cathodic overpotential of these composite films were examd. The cathodic overpotential of SLM was decreased by co-sputtering SLM and YSZ. The addn. of YSZ to SLM diminished the grain growth of SLM by annealing at a high.

ST sputtered composite film cathode **fuel cell**; YSZ lanthanum strontium manganese oxide cathode; elec cond cathodic overpotential **fuel cell**

IT Annealing

Electric conductivity

Fuel cell cathodes

Overvoltage

Reactive sputtering

(sputtered La_{0.5}Sr_{0.5}MnO₃-yttria stabilized zirconia composite film cathodes for solid oxide fuel cells)

AB The La_{0.5}Sr_{0.5}MnO₃ (SLM)-8 mol %yttria stabilized cubic zirconia (YSZ) composite film electrodes were prepd. by co-sputtering SLM and YSZ under an argon and oxygen mixed atm. The elec. cond. and cathodic overpotential of these composite films were examd. The cathodic overpotential of SLM was decreased by co-sputtering SLM and YSZ. The addn. of YSZ to SLM diminished the grain growth of SLM by annealing at a high temp.

REFERENCE COUNT: 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L1 ANSWER 16 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1997:173475 CAPLUS

DOCUMENT NUMBER: 126:240640

TITLE: Chemical compatibility of (La_{0.6}Ca_{0.4})xFe_{0.8}Mn_{0.2}O₃ with yttria-stabilized zirconia

AUTHOR(S): Kindermann, L.; Das, D.; Nickel, H.; Hilpert, K.; Appel, C. C.; Poulson, F. W.

CORPORATE SOURCE: Inst. Materials Energy Systems, Res. Centre Julich, Julich, Germany

SOURCE: Journal of the Electrochemical Society (1997), 144(2), 717-720

CODEN: JESOAN; ISSN: 0013-4651

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB . . . significantly lower than 900.degree.. The compatibility of the selected materials is necessary to guarantee long-term operation of a solid oxide **fuel cell**. Systematic investigations on the reactivity between the solid electrolyte yttria-stabilized zirconia (ZrO₂ + 8 mol percent Y₂O₃) and the perovskites (La_{0.6}Ca_{0.4})xFe_{0.8}Mn_{0.2}O₃ (x=1, 0.9; M=Cr, Mn, Co, Ni) were carried out. The results obtained are discussed.

ST **fuel cell** cathode lanthanum iron oxide; yttria

zirconia compatibility **fuel cell** cathode

IT **Fuel cell** cathodes
(chem. compatibility of $(\text{La}_{0.6}\text{Ca}_{0.4})\text{xFe}_{0.8}\text{M}_{0.2}\text{O}_3$ with yttria-stabilized zirconia)

AB LaFeO_3 -based perovskites are of interest as cathode material for the development of advanced solid oxide fuel cells operating at temps. significantly lower than 900.degree.. The compatibility of the selected materials is necessary to guarantee long-term operation of a solid oxide **fuel cell**. Systematic investigations on the reactivity between the solid electrolyte yttria-stabilized zirconia ($\text{ZrO}_2 + 8 \text{ mol}$ percent Y_2O_3) and the perovskites $(\text{La}_{0.6}\text{Ca}_{0.4})\text{xFe}_{0.8}\text{M}_{0.2}\text{O}_3$ ($\text{x}=1, 0.9$; $\text{M}=\text{Cr}, \text{Mn}, \text{Co}, \text{Ni}$) were carried out. The results obtained are discussed.

L1 ANSWER 17 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1996:678411 CAPLUS

DOCUMENT NUMBER: 126:34269

TITLE: Catalysis of the electrochemical processes on solid oxide **fuel cell** cathodes

AUTHOR(S): Erning, J. W.; Hauber, T.; Stimming, U.; Wippermann, K.

CORPORATE SOURCE: Institute of Energy Process Engineering (IEV), Forschungszentrum Juelich GmbH (KFA), PO Box 1913, 52425, Juelich, Germany

SOURCE: Journal of Power Sources (1996), 61(1-2), 205-211
CODEN: JPSODZ; ISSN: 0378-7753

PUBLISHER: Elsevier

DOCUMENT TYPE: Journal

LANGUAGE: English

TI Catalysis of the electrochemical processes on solid oxide **fuel cell** cathodes

AB Three methods of lowering the activation energy of the oxygen redn. reaction at solid oxide **fuel cell** (SOFC) cathodes are reported: (i) addn. of highly dispersed noble metals ($<0.1 \text{ mg/cm}^2$) at the $\text{La}_{0.84}\text{Sr}_{0.16}\text{MnO}_3$ cathode/yttria stabilized zirconia (YSZ) electrolyte interface; (ii) partial substitution of manganese by **cobalt** in $\text{La}_{0.79}\text{Sr}_{0.16}\text{MnO}_3$ cathodes, and (iii) combination of (i) and (ii). In the presence of palladium, the apparent activation energy, E_a , . . . from 2.2 eV ($\text{La}_{0.84}\text{Sr}_{0.16}\text{MnO}_3$ without catalyst) to 1.4 eV. A similar effect is obsd., when manganese is substituted by 20 **mol** % **Co** ($\text{La}_{0.79}\text{Sr}_{0.16}\text{Mn}_{0.80}\text{Co}_{0.20}\text{O}_3$), where $E_a \approx 0.9 \text{ eV}$ is obtained. In the presence of palladium, with the substitution of manganese by **cobalt** (method (iii)), no further improvement is achieved.

ST solid oxide **fuel cell** cathode catalysis

IT **Fuel cell** cathodes
Reduction, electrochemical
(catalysis of the electrochem. processes on solid oxide **fuel cell** cathodes)

IT Reduction catalysts
(electrochem.; catalysis of the electrochem. processes on solid oxide **fuel cell** cathodes)

IT 1314-23-4, Zirconia, uses
RL: DEV (Device component use); USES (Uses)
(Y_2O_3 -stabilized, electrolyte; catalysis of the electrochem. processes on solid oxide **fuel cell** cathodes)

IT 1314-36-9, Yttria, uses
RL: DEV (Device component use); USES (Uses)
(ZrO_2 stabilized with, electrolyte; catalysis of the electrochem. processes on solid oxide **fuel cell** cathodes)

IT 7439-88-5, Iridium, uses 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-18-8, Ruthenium, uses
RL: CAT (Catalyst use); USES (Uses)
(catalysis of the electrochem. processes on solid oxide **fuel**

cell cathodes)

IT 140884-85-1, Lanthanum manganese strontium oxide $\text{La}_{0.84}\text{MnSr}_{0.16}\text{O}_3$
 162191-00-6, Cobalt Lanthanum manganese strontium oxide
 $\text{Co}_{0.2}\text{La}_{0.79}\text{Mn}_{0.8}\text{Sr}_{0.16}\text{O}_3$ 164913-46-6, Cobalt Lanthanum manganese
 strontium oxide $\text{Co}_{0.1}\text{La}_{0.79}\text{Mn}_{0.9}\text{Sr}_{0.16}\text{O}_3$ 184844-08-4, Lanthanum
 manganese strontium oxide ($\text{La}_{0.79}\text{MnSr}_{0.16}\text{O}_3$)
 RL: DEV (Device component use); USES (Uses)
 (catalysis of the electrochem. processes on solid oxide **fuel**
 cell cathodes)

IT 114168-16-0, Yttrium zirconium oxide ($\text{Y}_{0.16}\text{Zr}_{0.92}\text{O}_{2.08}$)
 RL: DEV (Device component use); USES (Uses)
 (electrolyte; catalysis of the electrochem. processes on solid oxide
fuel cell cathodes)

IT 7782-44-7, Oxygen, reactions
 RL: RCT (Reactant); RACT (Reactant or reagent)
 (redn.; catalysis of the electrochem. processes on solid oxide
fuel cell cathodes)

AB Three methods of lowering the activation energy of the oxygen redn.
 reaction at solid oxide **fuel cell** (SOFC) cathodes are
 reported: (i) addn. of highly dispersed noble metals ($\sim 0.1 \text{ mg/cm}^2$)
 at the $\text{La}_{0.84}\text{Sr}_{0.16}\text{MnO}_3$ cathode/**yttria** stabilized zirconia (YSZ)
 electrolyte interface; (ii) partial substitution of manganese by
cobalt in $\text{La}_{0.79}\text{Sr}_{0.16}\text{MnO}_3$ cathodes, and (iii) combination of (i)
 and (ii). In the presence of palladium, the apparent activation energy,
 E_a , of the oxygen redn. reaction is decreased from 2.2 eV
 ($\text{La}_{0.84}\text{Sr}_{0.16}\text{MnO}_3$ without catalyst) to 1.4 eV. A similar effect is obsd.,
 when manganese is substituted by 20 mol% **Co**
 ($\text{La}_{0.79}\text{Sr}_{0.16}\text{Mn}_{0.80}\text{Co}_{0.20}\text{O}_3$), where $E_a \approx 0.9 \text{ eV}$ is obtained. In the
 presence of palladium, with the substitution of manganese by
cobalt (method (iii)), no further improvement is achieved.

L1 ANSWER 18 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1996:663911 CAPLUS

DOCUMENT NUMBER: 126:9956

TITLE: Chemical compatibility of the LaFeO_3 base perovskites
 ($\text{La}_{0.6}\text{Sr}_{0.4}\text{zFe}_{0.8}\text{M}_{0.2}\text{O}_{3-\delta}$, ($z = 1, 0.9$; $M = \text{Cr},$
 $\text{Mn}, \text{Co}, \text{Ni}$) with yttria stabilized zirconia

AUTHOR(S): Kindermann, L.; Das, D.; Nickel, H.; Hilpert, K.

CORPORATE SOURCE: Institute for Materials in Energy Systems Research
 Centre Juelich (KFA), Juelich, 52425, Germany

SOURCE: Solid State Ionics (1996), 89(3,4), 215-220
 CODEN: SSIOD3; ISSN: 0167-2738

PUBLISHER: Elsevier

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Physicochem. compatibilities of the series of LaFeO_3 base perovskites
 $\text{La}_{0.6}\text{Sr}_{0.4}\text{Fe}_{0.8}\text{M}_{0.2}\text{O}_{3-\delta}$ and ($\text{La}_{0.6}\text{Sr}_{0.4}\text{O}_{0.9}\text{Fe}_{0.8}\text{M}_{0.2}\text{O}_{3-\delta}$, ($M =$
 $\text{Cr}, \text{Mn}, \text{Co}, \text{Ni}$) with solid electrolyte **yttria**
 -stabilized (8 mol% Y_2O_3) cubic zirconia (8YSZ) were
 investigated. Powder mixts. of the perovskites with 8YSZ were annealed at
 1000.degree.C for time periods.

ST **fuel cell** solid oxide cathode; perovskite lanthanum
 ferrite yttria zirconia cathode

IT **Fuel cell** cathodes
 (chem. compatibility of the LaFeO_3 -based perovskites as cathode
 material for fuel cells)

AB Physicochem. compatibilities of the series of LaFeO_3 base perovskites
 $\text{La}_{0.6}\text{Sr}_{0.4}\text{Fe}_{0.8}\text{M}_{0.2}\text{O}_{3-\delta}$ and ($\text{La}_{0.6}\text{Sr}_{0.4}\text{O}_{0.9}\text{Fe}_{0.8}\text{M}_{0.2}\text{O}_{3-\delta}$, ($M =$
 $\text{Cr}, \text{Mn}, \text{Co}, \text{Ni}$) with solid electrolyte **yttria**
 -stabilized (8 mol% Y_2O_3) cubic zirconia (8YSZ) were
 investigated. Powder mixts. of the perovskites with 8YSZ were annealed at
 1000.degree.C for time periods up to 1300 h. The quenched samples were
 analyzed by XRD and SEM/EDX for identifying the reaction products. The
 results provide a working hypothesis for the development of improved

compos. of cathode materials in solid oxide fuel cells.

L1 ANSWER 19 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1996:608740 CAPLUS

DOCUMENT NUMBER: 125:259580

TITLE: Sputtered Ni-yttria stabilized zirconia composite film electrodes for SOFC

AUTHOR(S): Hayashi, Koichiro; Yamamoto, Osamu; Nishigaki, Yasuhiro; Minoura, Hideki

CORPORATE SOURCE: Gifu Prefectural Indus. Res. Technical Cent., Gifu, 501-61, Japan

SOURCE: Denki Kagaku oyobi Kogyo Butsuri Kagaku (1996), 64(10), 1097-1101

CODEN: DKOKAZ; ISSN: 0366-9297

PUBLISHER: Denki Kagaku Kyokai

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Nickel oxide and 8 mol % yttria stabilized cubic zirconia (YSZ) composite films were co-deposited on Al₂O₃ and YSZ substrates with a reactive sputtering technique in argon and oxygen atm. using Ni and YSZ targets and reduced in a gas flow of 96%N₂-4%H₂ at 1000.degree. for 3 h. The co-sputtering of YSZ and Ni suppressed the growth of Ni grains and decreased the anodic overvoltage for hydrogen oxidn. The composite. . .

ST sputtered nickel yttria stabilized zirconia electrode; solid oxide fuel cell composite electrode; anodic overvoltage hydrogen oxidn composite electrode

IT Electrodes

(fuel-cell, nickel oxide and yttria stabilized cubic zirconia composite films codeposited on Al₂O₃ and YSZ substrates by reactive sputtering technique and reduced for composite film)

IT 64417-98-7, Yttrium zirconium oxide

RL: DEV (Device component use); PRP (Properties); USES (Uses)

(nickel oxide and yttria stabilized cubic zirconia composite films codeposited on Al₂O₃ and YSZ substrates by reactive sputtering technique and reduced in 96%N₂-4%H₂ for composite film electrodes for solid oxide fuel cell)

IT 1313-99-1, Nickel oxide nio, uses 1344-28-1, Alumina, uses

114168-16-0, Yttrium zirconium oxide y0.16zr0.92o2.08

RL: DEV (Device component use); PRP (Properties); USES (Uses)

(nickel oxide and yttria stabilized cubic zirconia composite films codeposited on Al₂O₃ and YSZ substrates by reactive sputtering technique and reduced in gas flow of 96%N₂-4%H₂ for composite film electrodes for solid oxide fuel cell)

IT 1314-23-4, Zirconia, uses

RL: DEV (Device component use); PRP (Properties); USES (Uses)

(yttria-stabilized; nickel oxide and yttria stabilized cubic zirconia composite films codeposited on Al₂O₃ and YSZ substrates by reactive sputtering technique and reduced in 96%N₂-4%H₂ for composite film electrodes for solid oxide fuel cell)

IT 1314-36-9, Yttria, uses

RL: DEV (Device component use); PRP (Properties); USES (Uses)

(zirconia stabilized by; nickel oxide and yttria stabilized cubic zirconia composite films codeposited on Al₂O₃ and YSZ by reactive sputtering technique and reduced in 96%N₂-4%H₂ for composite film electrodes for solid oxide fuel cell)

AB Nickel oxide and 8 mol % yttria stabilized cubic zirconia (YSZ) composite films were co-deposited on Al₂O₃ and YSZ substrates with a reactive sputtering technique in argon and oxygen atm. using Ni and YSZ targets and reduced in a gas flow of 96%N₂-4%H₂ at 1000.degree. for 3 h. The co-sputtering of YSZ and Ni suppressed the growth of Ni grains and decreased the anodic overvoltage for hydrogen oxidn. The composite anode is esp. attractive as the SOFC operating at lower temps., e.g., 800.degree..

L1 ANSWER 20 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1993:499844 CAPLUS

DOCUMENT NUMBER: 119:99844

TITLE: High power density solid oxide electrolyte fuel cells using ruthenium/yttria-stabilized zirconia cermet anodes

AUTHOR(S): Suzuki, Minoru; Sasaki, Hirokazu; Otoshi, Shoji; Kajimura, Atsuko; Ippommatsu, Masamichi

CORPORATE SOURCE: Fundam. Res. Lab., Osaka Gas Co., Ltd., Osaka, 554, Japan

SOURCE: Solid State Ionics (1993), 62(1-2), 125-30
CODEN: SSIOD3; ISSN: 0167-2738

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Ru/YSZ cermet SOFC (solid oxide electrolyte fuel cells) anodes were fabricated by the EVD method. Ru has high sintering resistivity compared with Ni. During a power generation tests at 1273 K the Ru/YSZ (Ru/yttria stabilized zirconia) cermet anode showed high activity for hydrogen oxidn. compared with conventional Ni/YSZ cermet anodes. Esp. at a high. . . . a.c. polarization value was reduced to approx. 200 mV. Tubular type SOFCs were made by depositing 10 .mu.m thick 10 mol.% YSZ electrolyte films on porous La(Sr)MnOx cathode tubes using the EVD process and then making a Ru/YSZ cermet anode on YSZ. The cells had the highest power generation d., with a max. d. of 1550 mW/cm2. After. . . of approx. one week including several thermal cycles, the anode polarization was unchanged and there was no change in the Ru metal grain size.

ST fuel cell solid oxide anode; ruthenium yttria stabilized zirconia anode; cermet fuel cell anode

IT Anodes
(fuel-cell, ruthenium-yttria-stabilized zirconia, for high-power-d. solid oxide electrolyte cells)

AB Ru/YSZ cermet SOFC (solid oxide electrolyte fuel cells) anodes were fabricated by the EVD method. Ru has high sintering resistivity compared with Ni. During a power generation tests at 1273 K the Ru/YSZ (Ru/yttria stabilized zirconia) cermet anode showed high activity for hydrogen oxidn. compared with conventional Ni/YSZ cermet anodes. Esp. at a high c.d. of a max. of 3200 mA/cm2 the a.c. polarization value was reduced to approx. 200 mV. Tubular type SOFCs were made by depositing 10 .mu.m thick 10 mol.% YSZ electrolyte films on porous La(Sr)MnOx cathode tubes using the EVD process and then making a Ru/YSZ cermet anode on YSZ. The cells had the highest power generation d., with a max. d. of 1550 mW/cm2. After the power generation test of approx. one week including several thermal cycles, the anode polarization was unchanged and there was no change in the Ru metal grain size.

L1 ANSWER 21 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1990:182933 CAPLUS

DOCUMENT NUMBER: 112:182933

TITLE: Reforming catalysts for fuel cells

INVENTOR(S): Mushiai; Akira; Ishizaki, Fumiya; Segawa, Tomoko

PATENT ASSIGNEE(S): Toa Nenryo Kogyo K. K., Japan; Zaidan Hojin Sekiyu Sangyo Kaseika Center

SOURCE: Jpn. Kokai Tokkyo Koho, 7 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 02002878 A2 19900108 JP 1988-220494 19880905
PRIORITY APPLN. INFO.: JP 1988-57371 19880312

- AB Internal-reforming **fuel-cell** catalysts are Rh, Ru, Pd, or their alloys loaded on tetragonal or cubic Y2O3-contg. ZrO2 carriers. These catalysts have high efficiency of H prodn. and low C deposition. Thus, zirconia contg. 3 mol% **yttria** was pulverized, immersed in Rh chloride soln., and dried to obtain a catalyst contg. 0.5wt.% Rh.
- ST internal reforming catalyst **fuel cell**; yttria stabilized zirconia catalyst carrier; rhodium reforming catalyst **fuel cell**; ruthenium reforming catalyst **fuel cell**; palladium reforming catalyst **fuel cell**
- AB Internal-reforming **fuel-cell** catalysts are Rh, Ru, Pd, or their alloys loaded on tetragonal or cubic Y2O3-contg. ZrO2 carriers. These catalysts have high efficiency of H prodn. and low C deposition. Thus, zirconia contg. 3 mol% **yttria** was pulverized, immersed in Rh chloride soln., and dried to obtain a catalyst contg. 0.5wt.% Rh.

L1 ANSWER 22 OF 22 CAPLUS COPYRIGHT 2003 ACS on STN

ACCESSION NUMBER: 1990:122139 CAPLUS

DOCUMENT NUMBER: 112:122139

TITLE: Solid-state reaction of lanthanum **cobalt** nickel oxide [La(Co_{1-x}Ni_x)O₃] with 10 mol% **yttria-zirconia**

AUTHOR(S): Echigoya, J.; Hiratsuka, S.; Suto, H.

CORPORATE SOURCE: Fac. Eng., Tohoku Univ., Sendai, 980, Japan

SOURCE: Materials Transactions, JIM (1989), 30(10), 789-99
CODEN: MTJIEY; ISSN: 0916-1821

DOCUMENT TYPE: Journal

LANGUAGE: English

TI Solid-state reaction of lanthanum **cobalt** nickel oxide [La(Co_{1-x}Ni_x)O₃] with 10 mol% **yttria-zirconia**

ST **fuel cell** electrode material reaction; electrolyte electrode reaction **fuel cell**; lanthanum cobalt nickel oxide electrode; yttria zirconia electrolyte **fuel cell**

IT Crystal structure
(of cobalt lanthanum nickel oxides, for **fuel cell** electrodes)

IT Electric resistance
(of cobalt lanthanum nickel oxides, for **fuel cell** electrodes, yttria-zirconia electrolyte bonding in relation to)

IT Electrodes
(**fuel-cell**, lanthanum cobalt nickel oxide for, yttria-stabilized zirconia interaction with)

IT Expansion, Dilation, and Elongation
(thermal, of cobalt lanthanum nickel oxides, for **fuel cell** electrodes, yttria-zirconia electrolyte bonding in relation to)

IT 12016-86-3, Cobalt lanthanum oxide (CoLaO₃) 12031-18-4, Lanthanum nickel oxide (LaNiO₃) 80302-08-5, Cobalt lanthanum nickel oxide (Co_{0.5}LaNi_{0.5}O₃) 114168-25-1, Cobalt lanthanum nickel oxide (Co_{0.6}LaNi_{0.4}O₃) 117058-53-4, Cobalt lanthanum nickel oxide (Co_{0.4}LaNi_{0.6}O₃) 123517-02-2, Cobalt lanthanum nickel oxide (Co_{0.2}LaNi_{0.8}O₃) 125862-38-6, Cobalt lanthanum nickel oxide (Co_{0.8}LaNi_{0.2}O₃)

RL: PRP (Properties)

(crystal structure and thermal expansion and elec. resistance of, temp. effect on, for **fuel cell** electrodes)

AB The reaction of cubic ZrO₃ with La(Co_{1-x}Ni_x)O₃ was investigated during hot pressing at 1573 K, for manuf. of electrodes for high temp. fuel cells. The reaction occurred for all x values. The compns. of the reacted areas were estd. as La₂Zr₂O₇, La₂Zr(Ni_{0.6}Co_{0.4})O₆, and La₂ZrNiO₆ for x = 0, 0.4, and 1, resp. The width of the reacted area decreased with increasing Ni

fraction. Sintering of samples with compns. of the reacted areas was carried out to investigate the crystal structure, elec. resistivity, and thermal expansion coeff. of the reacted compds. The thermal expansion coeffs. of the reacted compds. were always intermediate between those of cubic ZrO_2 and $\text{La}(\text{Co}_{1-x}\text{Ni}_x)\text{O}_3$. The elec. resistivity of $\text{La}_2\text{Zr}_2\text{O}_7$ was in the order of 10^3 $\Omega\cdot\text{cm}$ even at 1273 K. The substitution of Ni or Co for the Zr site caused a decrease in the elec. resistivity which became $\sim 10^{-1}$ $\Omega\cdot\text{cm}$ at 1273 K. Electrode materials of cubic ZrO_2 are also described.